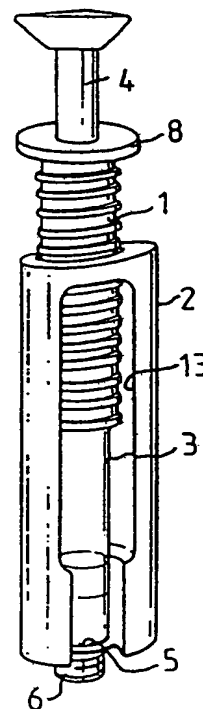




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>5</sup> :</b>  <b>A61M 5/24</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 93/14799</b>  <b>(43) International Publication Date:</b> 5 August 1993 (05.08.93)
<b>(21) International Application Number:</b> PCT/SE93/00015 <b>(22) International Filing Date:</b> 14 January 1993 (14.01.93)  <b>(30) Priority data:</b> 9200172-6 22 January 1992 (22.01.92) SE  <b>(71) Applicant (for all designated States except US):</b> KABI PHARMACIA AB [SE/SE]; S-751 82 Uppsala (SE).  <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only) :</b> LEVANDER, Gustav [SE/SE]; Järpstigen 16, S-161 28 Bromma (SE). LJUNGQUIST, Olle [SE/SE]; Havrevägen 21, S-183 67 Täby (SE).  <b>(74) Common Representative:</b> KABI PHARMACIA AB; Patent Department, S-112 87 Stockholm (SE).		<b>(81) Designated States:</b> AU, CA, FI, JP, NO, NZ, RU, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i>
<b>(54) Title: A MEDICINE DISPENSING DEVICE</b>  <b>(57) Abstract</b>  <p>The invention relates to a medicine dispensing device which includes an arrangement for resetting its dosage metering and discharging parts so as to enable a new dosage ampoule to be inserted. The dispenser is mainly comprised of a slotted and hollow housing (2) for receiving dosage ampoules (3). Arranged at the rear end of the housing is a screw-threaded device (1) which has dosing and discharging means (4) connected thereto. The ampoule is secured in the housing by the screw-threaded device in coaction with a fitting (5), by screwing the screw-threaded device into at least one screw-threaded part of the rear opening of the housing. The screw-threaded device and the ampoule can be swung radially from the housing, by virtue of the fact that subsequent to administering a dosage from the ampoule, the ampoule is able to move axially in the hollow housing, and also by virtue of the fact that this screw-threaded part is positioned so that the screw-threaded device will pass out of engagement therewith when swung radially from the housing and withdrawn to its starting position, for the insertion of a new ampoule.</p>		



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A medicine dispensing deviceTechnical field

5 The present invention relates to a device for dispens-  
ing liquid substances in metered quantities from a  
container, said device including a mechanism by means  
of which, after administering the contents of the  
10 container, the device can be easily returned to its  
original state, in which it is able to receive a  
further container and to dispense measured quantities  
of medicine therefrom. The invention particularly re-  
lates to the dispensing of medicines from a dosage  
15 cartridge or ampoule.

According to another aspect, the invention further re-  
lates to an arrangement by means of which the dispens-  
er can be returned to its original operative state.

20 Background of the invention

One problem with known devices used to administer  
measured quantities of medicine, i.e. dosages, such as  
hypodermic syringes in particular and also devices  
25 used to administer medicines in a pulverulent or  
viscous dosage form, is that they lack the provision  
of means which will ensure that the dispensing device  
can be returned quickly to its original state so that  
a new dosage ampoule can be fitted into the device.

30 The concept of the present invention can be readily  
applied to different known kinds of medicine dispens-  
ing devices which include a screw mechanism for  
reconstituting and/or metering and administering the  
35 content of a prefilled ampoule. Dispensers of this  
kind are well known in the art; see for instance  
US,A,4,592,745.

Swedish patent specifications SE,B,465065 and SE,B,-  
464797 (corresponding to EP,B,298067) describe dis-  
pensers in the form of hypodermic syringes which  
include a screw mechanism for displacing a plunger in  
5 a prefilled cylinder.

These specifications disclose how dual-chamber am-  
poules can be reconstituted by rotating the screw.  
Dispensing and administering of the medicine is then  
10 effected with the aid of an arrangement which is  
activated by means of an operating lever.

In order to return a syringe of this kind to its  
original state and therewith enable a fresh ampoule to  
15 be fitted and reconstituted and its contents dispens-  
ed, it is necessary to withdraw the screw mechanism  
manually back to its starting position. This is a time  
consuming task and may easily be neglected, which may  
result in damage to the screw mechanism or in an  
20 impairment in the metering accuracy of the dispenser.

Although this problem can be overcome by constructing  
the dispenser, or syringe, for one-time-use only, with  
the intention of discarding the dispenser after having  
25 emptied the ampoule with the plunger located in its  
forward position, this solution is not a desirable  
solution, mainly for material handling reasons.

Consequently, there is a need for a dispenser which  
30 includes a simple arrangement by means of which those  
components of the dispenser which have been active in  
reconstituting and/or dispensing a measured quantity  
of medicine, or dose, can be quickly returned to their  
respective starting positions after emptying the  
35 ampoule. This applies in particular to the type of  
hypodermic needles described above, such needles being  
widely used within the art.

It is particularly desirable to provide an arrangement by means of which a screw-threaded actuator or like devices, such as the screw described above for instance, is returned quickly to its starting position in which the dispenser, or syringe, can be fitted with a fresh ampoule.

Swedish published specification 379089 and FR,A1, 2613789 teach a number of technical solutions to the problem of moving such screw-like devices quickly with the intention of releasing or securing the devices without coming into contact with the screw threads thereof.

None of these publications, however, gives an indication as to how a screw-threaded actuator intended for dispensing a metered quantity of medicine from an ampoule or similar container can be returned to its original position for administering a new dosage.

This problem is solved by the present invention, which provides a medicine dispensing device which includes an arrangement by means of which the screw-threaded actuator can be reset quickly and readily for renewed administration of a medicine dosage.

#### Disclosure of the invention

The medicine dispenser comprises generally a slotted housing which is constructed to receive a dosage ampoule and which includes at its forward end a dosage ampoule fitting and a dispensing conduit connected thereto. Mounted at the rear end of the housing is a screw-like device which functions to secure the ampoule in said fitting and which is connected to a dosage dispensing and discharging device.

According to the invention, the dispensing device is constructed so that the ampoule and the dosage

dispensing and discharging device can be swung radially out from the housing through the slotted region thereof in a given state of the dispenser. By this is meant that after dispensing and discharging the content of the ampoule, the screw device can be released from the housing by swinging the device radially about its long axis, therewith enabling the ampoule to be removed radially from the dispenser housing.

As the screw-threaded discharging device is screwed down it assists in securing the ampoule in the housing, and may also contribute towards reconstituting the ampoule content, for instance by including a known mechanism for reconstituting the content of a multi-chamber ampoule (see for instance EP,B,298067). The dispensing and discharging device may include a plurality of mechanisms that are well known to the person skilled in this art, for instance mechanisms which are able to reconstitute the content of a multi-chamber ampoule and divide the ampoule into different, adjustable dosages, and to discharge the ampoule content from the dispenser. In its simplest form, the dispensing-and-discharging device may consist of an axially movable plunger rod connected to the screw-threaded device. The ampoule may consist of one or more chambers of which one may contain a reconstitutible medicine in powder form and may also include displaceable plungers which are actuatable by component parts of the discharge device.

It lies within the general purviews of the invention to provide a number of different discharge devices and ampoules of alternative embodiments, according to the type of dispensing or metering desired.

The dosage ampoule is accommodated in a space provided in the housing to this end. As before mentioned, the discharge device includes a screw-threaded device which can be screwed into the rear opening of the

housing, said opening having at least one screw-threaded part. The ampoule is guided axially into a fitting provided adjacent the front opening of the housing, as the screw-threaded device is screwed into said rear opening.

The ampoule can then be reconstituted and dosages for administration prepared, with the aid of the various component parts of the discharge device, in a known manner.

The arrangement is such that the ampoule is able to move axially in the hollow holder when empty and, consequently, sufficient axial space is obtainable for the empty ampoule and the screw-threaded device to be swung away from the housing and released, this axial movement of the ampoule in the container also enabling the screw-like discharge device to be removed from the holder. To this end, the screw-threaded device is configured so that the weight of the ampoule will cause the ampoule to fall back axially within said device through a distance sufficient to enable the ampoule to be released from the securing device and to enable the screw-threaded device to be released from the holder. The loosened screw-threaded device can now be moved free from the screw-threaded part or parts of the opening, by swinging the device radially about its long axis, and is then returned to its original position for fitting and dissections charging of a new ampoule. The consumed dosage ampoule can be removed radially and replaced.

The screw-threaded device with connected dispensing and discharging devices can be released from the screw-threaded part or parts of said opening by swinging the device radially and by withdrawing said devices beyond said screw-threaded section or sections to their starting position for receiving a new dosage ampoule. The screw-threaded device and dispensing and

discharging devices are constructed to this end in a manner described herebelow with reference to a preferred embodiment of the invention.

5     Brief description of the drawings

So that the invention will be more readily understood and further features thereof made apparent, the invention will now be described with reference to an exemplifying embodiment thereof and also with reference to  
10     the accompanying drawings, in which  
Figure 1 illustrates a suitable exemplifying embodiment of the inventive medicine dispensing device;  
Figure 2 is a sectional view of the device shown in  
15     Figure 1;  
Figure 3A is a principle sectional view of a screw-threaded device and slotted housing having two screw-threaded parts, and shows the screw-threaded device in its starting position;  
20     Figure 3B is a principle, sectional view corresponding to the view shown in Figure 3A, with the screw-threaded device in its bottom position;  
Figure 3C is a principle, sectional view corresponding to the views of Figure 3A and 3B, and shows the screw-  
25     threaded device swung radially out of the housing through a slotted region thereof, and withdrawn beyond the screw-threaded parts, back to its starting position; and  
Figures 4A and 4B are principle, sectional views which  
30     show that the slotted housing may be provided with only one screw-threaded part and effect the return illustrated in Figures 3A to 3C.

According to one particularly preferred embodiment  
35     (see Figures 1 and 2) the screw-threaded device with connected dispensing and discharging devices is comprised of a screw 1 and a dispensing piston rod 4 connected thereto. When inserting a dosage ampoule 3, the screw is screwed into the hollow and slotted



housing 2, which is provided in its rear opening 11 with at least one screw-threaded part 7 (see Figure 3A), wherein the ampoule is guided into a fitting in the forward end 12 of the housing as the screw is  
5 turned in the screw thread, said fitting having the form of an ampoule securing recess 5. As will be seen from the drawings, the housing is slotted so as to enable the ampoule and the screw-threaded device to be swung outwardly therefrom.

10 In other embodiments of the invention, the screw may be caused to coact with a plunger rod of known construction (not shown) in a manner to result in reconstitution of the content of a multi-chamber ampoule and to dispense metered dosages of said ampoule content.  
15

The dosage ampoule is preferably cylindrical and may be configured in a number of different ways. For  
20 instance, the ampoule may include one or several chambers and may optionally include displaceable plungers capable of being activated by means of the inventive discharging mechanism.

25 When the screw 1 has been screwed down to its limit, the ampoule contents may be discharged through a cannula or injection needle attached to the attachment device 6, by moving the plunger rod 4.

30 The screw is returned to its starting position by tipping the whole of the dispensing device backwards, whereupon the ampoule is able to fall back axially through a hollow space 10 provided in the screw, so as to loosen the ampoule from the recess 5 and also from  
35 the housing. The plunger rod returns to its starting position under its own weight, and the screw is loosened from the screw-threaded parts 7 by rotating the screw radially out of contact with said part(s) 7 and returning the screw to its starting position in the

aforedescribed manner (see Figure 3C).

5 After emptying the ampoule, the plunger rod can be moved rearwardly in an axial direction through a distance corresponding to the last dosage dispensed from the ampoule, such as to further assist the am-  
poule in its axial movement. Rearward movement of the plunger rod is limited by a shoulder 9. This enables the ampoule to be released from the housing through  
10 said groove and removed radially therefrom and a further ampoule to be inserted through an opening 13 in the housing periphery.

15 Release of the screw from the screw-threaded parts of the housing is made possible because they have been placed at a given axial distance apart, such that the distance between said parts is greater than the diame-  
ter of the screw-threaded device when said device is swung radially through the slotted region of the  
20 housing. As a result of this positioning of the screw-threaded parts, the screw-threaded device will pass free from the screw threads when said device is swung radially and drawn back to its starting position for administering a new dosage (see Figures 3A-3C). This  
25 return of the discharge device to its starting position can be further facilitated by bevelling the upper opening of the housing in a manner to form a space adapted for the discharge device when said device is swung radially and drawn to its starting position. The  
30 housing may also be provided with only one screw-threaded part. This screw-threaded part should then be placed at a suitable axial distance from the rear opening of the housing, so that the discharge device will pass free from engagement with said opening when  
35 rotated radially (see Figures 4A and 4B).

The position of respective screw-threaded parts and their configuration are adapted to each manner of construction of the holder and screw-threaded device.

Such constructional embodiments are well known to the person skilled in this art and may lead to a large number of embodiments, all of which lie within the scope of the present invention.

5

It will be understood that the invention is not restricted to the aforescribed and illustrated exemplifying embodiments thereof. For instance the aforescribed dispensing device and mechanism can be used for rapidly returning the discharge devices of injection needles to their original positions and for replacing empty ampoules with fresh ampoules, and with other medicine dispensing devices which include a screw mechanism.

15

The medicine dispensing device and mechanism can be adapted for use with essentially all types of medicine dispensing processes effected with the aid of different types of containers or dosage ampoules, such as parenteral, oral, nasal, rectal and ocular administration of metered dosages of medicine.

20

CLAIMS

1. A medicine dispensing device comprising generally a housing which is adapted to receive a dosage ampoule and which has at its front end a dosage ampoule fitting and a discharge conduit for connection with said ampoule, and further comprising a screw-threaded device which can be applied to the rear end of said housing for securing the ampoule therein, said screw-threaded device being connected to a medicine metering and discharge device, c h a r a c t e r i z e d in that the housing is slotted (13); and in that the dispensing device includes means (10) which subsequent to having administering a given dosage functions to allow the ampoule and the screw-threaded device to be swung radially through the slotted region of the housing and moved back to a starting position in which the device is able to receive a new ampoule.
2. A dispenser according to Claim 1, c h a r a c t e r i z e d in that subsequent to administering a desired dosage, said means (10) enables the ampoule to move axially in the housing, such as, in turn, to enable the screw-threaded device and the ampoule to be swung outwardly from the housing through the slotted region thereof.
3. A dispenser according to Claim 1 or Claim 2, c h a r a c t e r i z e d in that the screw-threaded device is hollow (10); in that an ampoule can be fitted into the screw-threaded device so as to be movable in the axial direction thereof; in that arranged in the hollow part of the screw-threaded device is a discharging and metering device which is intended to act upon the ampoule and to meter and discharge the contents thereof; in that the housing has a rear opening which is provided with at least one screw-threaded arcuate part for securing the ampoule in the

device with the aid of said screw-threaded device; and in that the screw-threaded device can be freed from said screw-threaded part by swinging said screw-threaded device radially, so as to enable the screw-threaded device and the discharging and metering device to be moved freely rearwardly and returned to their starting positions in which a new ampoule can be inserted and its contents dispensed and administered.

4. A dispenser according to Claim 3, c h a r a c -  
t e r i z e d in that subsequent to dispensing its  
contents, the ampoule can be moved axially and rear-  
wardly in the hollow screw-threaded device to an  
extent sufficient to release the ampoule from engage-  
ment with the ampoule fitting; and in that the screw-  
threaded device is thereby released from the housing  
so as to enable the ampoule to be swung radially and  
therewith removed from the dispenser and replaced with  
a fresh ampoule through the slotted region of the  
housing.

5. A dispenser according to Claim 3 or Claim 4, in  
which the rear opening of the housing has more than  
one screw-threaded arcuate part, c h a r a c -  
t e r i z e d in that the screw-threaded arcuate  
parts are mutually spaced apart at a distance which is  
greater than the diameter of the screw-threaded device  
when said screw-threaded device is swung radially out  
of the housing and drawn back to its starting posi-  
tion.

6. A dispenser according to Claim 3 or 4, in which  
the housing is provided with only one screw-threaded  
part, c h a r a c t e r i z e d in that the screw-  
threaded part is placed at a distance from the rear  
opening of the housing such that the screw-threaded  
device will pass free from said opening when the  
device is swung radially from the housing and drawn  
back to its starting position.

7. A dispenser according to Claims 3-6, c h a r a c -  
t e r i z e d in that the rear opening of the housing  
is bevelled so as to provide space for the screw-  
threaded device when said device is swung radially  
5 away from the housing and drawn back to its starting  
position.
8. A dispenser according to any one of Claims 1-7,  
c h a r a c t e r i z e d in that the screw-threaded  
10 device (1) is connected to a dispensing or metering  
plunger rod (4) which is able to return to its start-  
ing position under the influence of its own weight  
subsequent to dispensing the contents of the ampoule  
(3); and in that the ampoule fitting has the form of a  
15 recess (5) adapted to the shape of the ampoule.
9. A dispenser according to Claim 8, c h a r a c -  
t e r i z e d in that this axial movement of the  
ampoule is achieved by virtue of the fact that subse-  
20 quent to dispensing a dosage from the ampoule the  
plunger rod (4) is able to move rearwardly through a  
distance corresponding to the dispensed volume.
10. A dispenser according to any one of the preceding  
25 Claims, c h a r a c t e r i z e d in that the dosage  
ampoule is cylindrical and contains one or more cham-  
bers; and in that the dispenser includes means (6) for  
attaching a cannula or an injection needle thereto, so  
as to enable the dispenser to be used for parenteral  
30 injection.
11. A mechanism for resetting a screw-threaded device  
having an associated dosing and discharging device  
which can be connected to a housing adapted to receive  
35 a replaceable liquid-containing dosage ampoule to a  
starting position in which a new dosage ampoule can be  
inserted and its contents administered, c h a r a c -  
t e r i z e d in that the dosage ampoule and the  
screw-threaded device can be released radially from

the housing after discharging and administering the contents of the ampoule.

5 12. A mechanism according to Claim 11, c h a r a c -  
t e r i z e d in that the screw-threaded device can  
be swung radially from the holder partly because the  
ampoule is fitted so as to be movable axially in the  
10 housing subsequent to administering the contents of  
the ampoule and therewith release the screw-threaded  
device from the container, and partly because the rear  
opening of the housing is provided with at least one  
screw-threaded part which is so positioned that the  
15 screw-threaded device will pass free from their at  
least one screw-threaded part when said screw-threaded  
device is swung radially, therewith enabling said  
device to be returned to its starting position.

20 13. A mechanism according to Claim 12, c h a r a c -  
t e r i z e d in that the screw-threaded device is  
hollow, such as to form a space in which the ampoule  
can move axially subsequent to administering its  
contents; and in that the dispensing and discharge  
25 device connected to said screw-threaded device in-  
cludes a piston rod which is able to move axially  
rearwards after administering the contents of said  
ampoule, therewith contributing to the axial movement  
of the ampoule; and in that the rear opening of the  
30 housing is bevelled so as to provide a space for  
accommodating the screw-threaded device when said  
device is swung radially out of the housing and with-  
drawn to its starting position for administering a new  
dosage.

35 14. A mechanism according to Claim 12-13, when the  
rear opening of the housing has more than one screw-  
threaded part, c h a r a c t e r i z e d in that the  
screw-threaded parts are spaced mutually apart at a  
distance which is essentially greater than the

diameter of the discharge device when said device is swung radially.

- 5 15. A mechanism according to Claim 12-13 wherein the rear opening of the housing has only one screw-thread-  
ed part, c h a r a c t e r i z e d in that the  
screw-threaded part is placed at an axial distance  
from the rear opening of the housing such that the  
10 discharge device will pass free from its engagement  
with said screw-threaded part when said device is  
swung radially out of the housing.



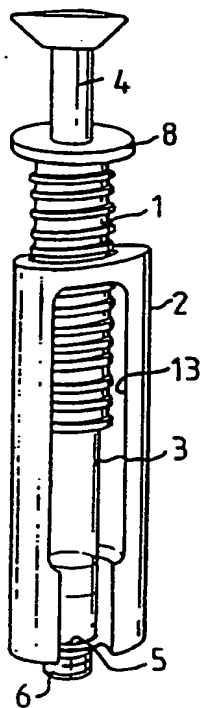


FIG.1

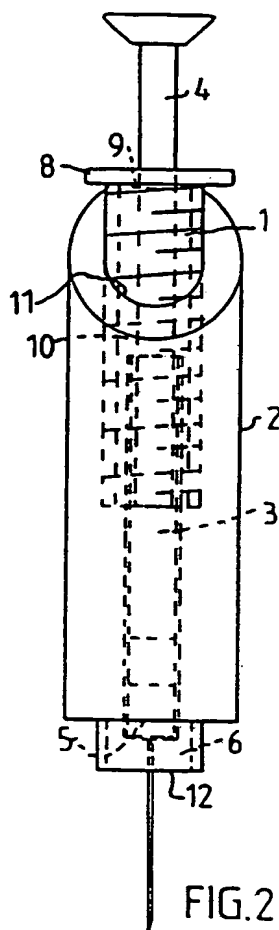


FIG.2

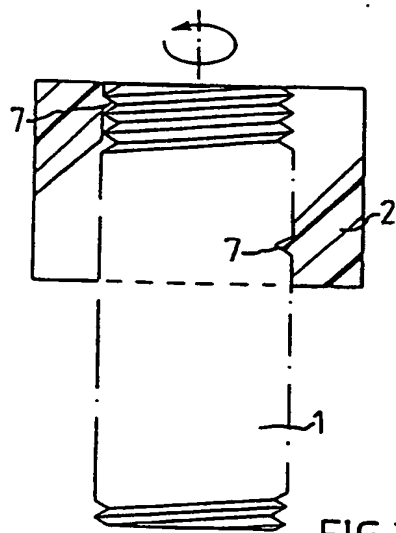


FIG. 3A

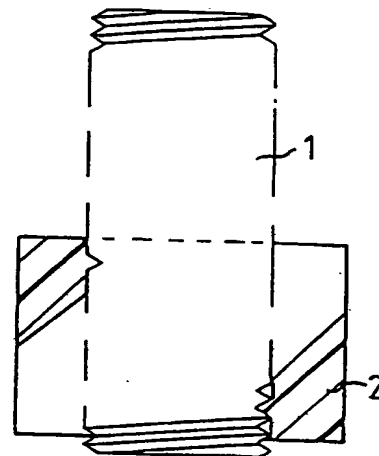


FIG. 3B

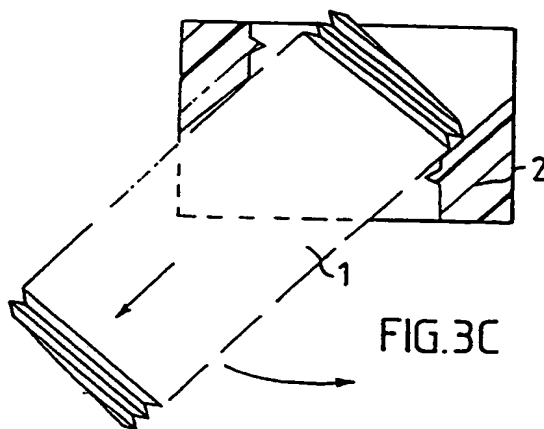


FIG. 3C

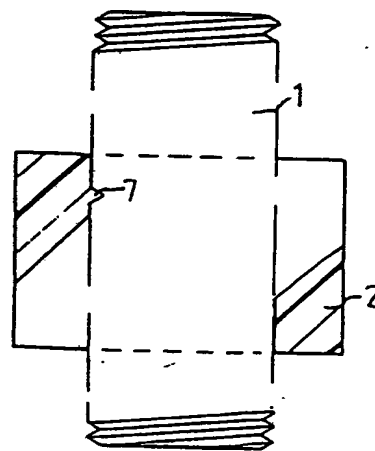


FIG. 4A

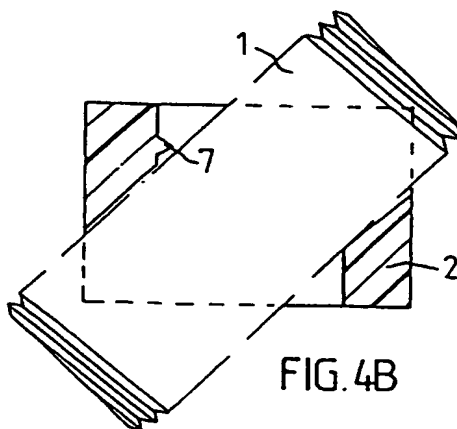


FIG. 4B

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 93/00015

## A. CLASSIFICATION OF SUBJECT MATTER

IPC5: A61M 5/24

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: A61M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP, A1, 0298067 (KABIVITRUM AB), 4 January 1989 (04.01.89)	1-15
A	US, A, 4592745 (JØRN REX ET AL), 3 June 1986 (03.06.86)	1-15
A	US, A, 2118221 (FELIX C. MONTUORI), 24 May 1938 (24.05.38)	1-15

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A1- 0298067	04/01/89	SE-T3- 0298067 AU-B- 613379 AU-A- 1860788 DE-A- 3865756 JP-A- 1080371 SE-B,C- 465065 SE-A- 8702735 US-A- 4968299 SE-B,C- 464797 SE-A- 8801405	01/08/91 05/01/89 28/11/91 27/03/89 22/07/91 03/01/89 06/11/90 17/06/91 16/10/89
US-A- 4592745	03/06/86	CA-A- 1230028	08/12/87
US-A- 2118221	24/05/38	NONE	

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